

INSTALLATION & MAINTENANCE MANUAL

QuickDraw[®] Storage and Semi-instantaneous Boiler Water Heaters

Installation and service must be performed by a qualified service installer, service agency or the utility supplier.

IMPORTANT: THIS MANUAL CONTAINS INFORMATION REQUIRED FOR INSTALLATION, OPERATION AND MAINTENANCE OF THIS EQUIPMENT. READ AND FOLLOW ALL INSTRUCTIONS, LABELS AND MARKINGS BEFORE INSTALLING, OPERATING OR SERVICING THIS UNIT.



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TO THE INSTALLER: After installation, these instructions must be given to the equipment user or left near the appliance.

SPECIAL INSTRUCTIONS TO THE OWNER: Retain this manual for future reference. These instructions contain important information that will help you in maintaining and operating this appliance.



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CHECKING EQUIPMENT BEFORE YOU INSTALL

Inspect the unit completely upon receipt from the freight carrier before signing the bill of lading. Inspect the appliance and all accompanying parts for signs of impact or mishandling. Verify the total number of pieces shown on packing slips with those actually received. Contact the freight carrier immediately if any damage or shortage is detected.

WARRANTY

Factory warranty does not cover improper installation or operation. (See warranty for complete details). Warranty exclusions include but are not limited to failure or malfunctions resulting from:

1. Failures to properly apply, install, operate, or maintain the appliance in accordance to printed instructions.
2. Abuse, alteration, accident, fire, flood and the like.
3. Sediment or lime buildup, freezing or any other conditions causing inadequate circulation.
4. Corrosive or contaminated atmosphere.

LOCATION

1. Locate the unit in a clean and dry area as close as possible to the greatest hot water usage and as near to boiler water and/or electrical power as practical.
2. Install the unit on a firm, level foundation.
3. Locate the foundation on a pitched floor near a suitable drain, or make other provisions to prevent contact to areas of the building subject to water damage should the boiler or a water connection leak.
4. The drain must be sufficient to contain water in excess of 210°F.

CODES

The equipment shall be installed in accordance with the instructions in this manual, appliance markings and supplemental instructions and in compliance with those installation regulations in force in the local area where the installation is to be made. These shall be carefully followed in all cases. Authorities having jurisdiction shall be consulted before installation is made. All appliances conform to the latest edition of the ASME Boiler and Pressure Vessel Code, Section IV, Part HLW.

ELECTRICAL

The heater is wired for 120VAC/1ph/60Hz volts and must be electrically grounded in accordance with local codes, or in the absence of local codes, with the latest edition of the National Electrical Code ANSI/NFPA. When unit is installed in Canada, it must conform to the CSA C22.1, Canadian Electrical Code (CEC), Part 1 and/or local electrical codes.

1. Branch circuit protection and disconnecting means must be furnished by the installer. Refer to the wiring diagram provided with this unit when installing or troubleshooting the electrical components of this heater.
2. All wiring must be in accordance with all local, state, or federal codes
3. Provide proper overload protection for the system's circulating pump.

Note: Use only copper wire of proper sizing for incoming service. The warranty on this unit does not cover damage resulting from the use of aluminum wiring.

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INSTALLATION

WARNING: Use industry standard safe rigging methods when attempting to lift or move this product. Failure to follow these instructions could result in property damage, serious injury or death. One common method includes the use of straps and spreader bars, lifting from the water heater base skid assembly.

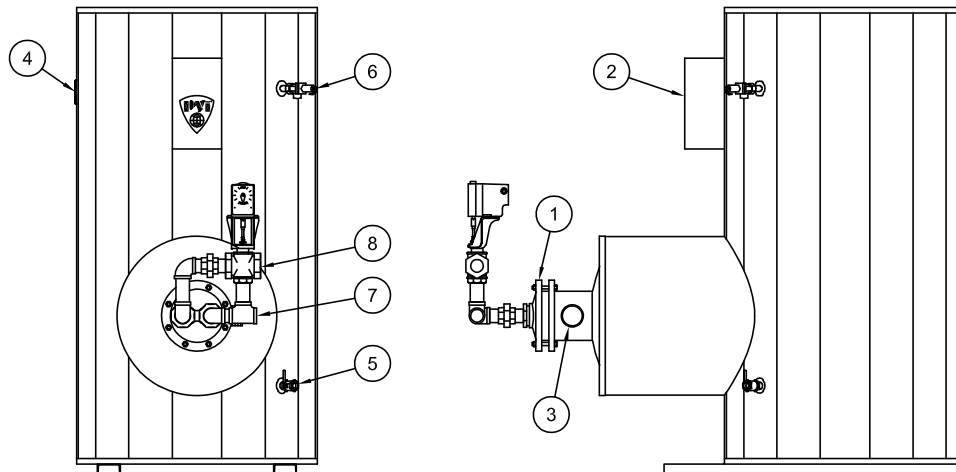
1. Check the data decal on the heater. Be sure the electrical supply is adequate for the installation.
2. Carefully remove all shipping supports and bracing.
3. Do not attempt to move or lift heater by the plumbing connections or heat exchanger. Lift only by the skid using industry standard safe rigging methods.
4. Provide sufficient clearance in front of heat exchanger to facilitate maintenance and removal. See "Service Clearances" below.
5. Install shut-off valves and unions on the inlet and outlet water piping for servicing. Use caution when threading pipe nipples into tank connections to prevent cross threading, or over-tightening. Always use a back-up wrench on tank nipples when tightening unions, valves, etc.
6. Insulate hot water and return circulation lines. Insulate cold water supply lines if subject to freezing during shutdown periods. **IMPORTANT: Do not use the plumbing connected to the appliance as a ground for welding or any other purpose.**
7. The water heater is equipped with a temperature and pressure relief valve(s) rated for the input. Pipe the relief valve discharge to a suitable open drain. The drain pipe may not be smaller than the relief valve opening and must be secured to prevent it from lifting out of the drain under discharge pressure. Do not install valves or restrictions in the discharge line.
8. Pipe the drain valve to a suitable open drain.

WARNING: All system piping to the heat exchanger plumbing must be adequately supported. Failure to do so will result in excessive loads on the heat exchanger connections causing damage and/or leakage and potential injury to adjacent personnel.

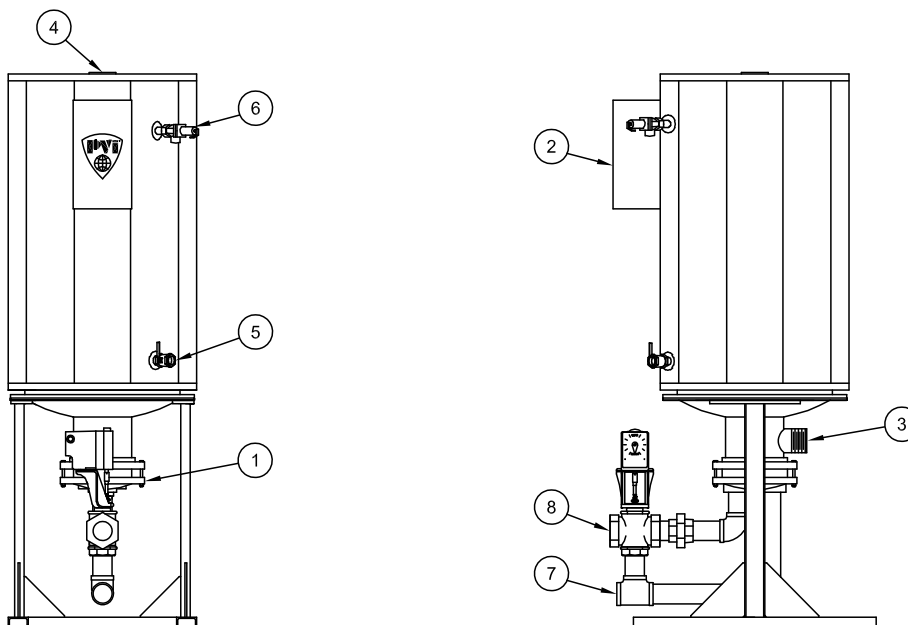
SERVICE CLEARANCES

Allow sufficient space to provide adequate clearances on all sides for service and inspection. Recommended clearance is 24" at the top and front, 18" at left and right sides of the appliance. Optional equipment may increase the clearance requirements. Allow sufficient space for installing and servicing connections such as water, electrical, pump and other auxiliary equipment.

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Typical QuickDraw[®] Storage Construction



Typical QuickDraw[®] Instantaneous Construction

- | | |
|--------------------------------|-------------------------|
| 1. U-tube Heat Exchanger | 5. Potable Water Inlet |
| 2. Tank Drain | 6. Steam Inlet |
| 3. Control Enclosure | 7. Potable Water Outlet |
| 4. Relief Valve (AGA optional) | 8. Condensate Outlet |

Note: Components, controls and connection locations may vary.

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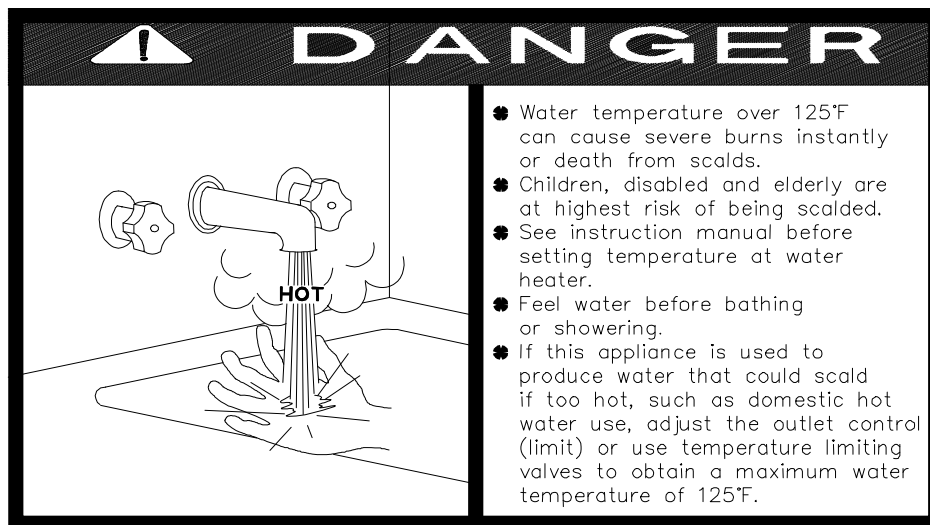
IMPORTANT SAFETY NOTE

It takes only 5 seconds of skin contact with 140°F water to cause a second degree burn! You must protect against high water temperatures at all lavatories, tubs, showers and other points of hot water contact.

Accidental scalding from high water temperatures is a greater risk in some types of installations. Some examples are:

***HOMES FOR THE MENTALLY HANDICAPPED
HOMES FOR THE PHYSICALLY HANDICAPPED
HOSPITALS AND NURSING HOMES
ELDER CARE FACILITIES AND REST HOMES
ORPHANAGES AND CHILD CARE FACILITIES***

***OTHER INSTALLATIONS - WHERE RESPONSE TO CONTACT WITH HOT WATER
MAY BE SLOWER OR WHERE THE DANGER OF HOT WATER CONTACT IS GREATER***



Thermostatically controlled mixing valves must be used in the design of the potable hot water system.

Potable hot water should be tempered to no more than 110°F when used for bathing or other personal uses.

Good engineering practice mandates the use of thermostatically controlled mixing valves set at 120°F or less to keep the delivered water temperature below scalding temperatures.

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WATER INLET / OUTLET CONNECTIONS

Important: Do not use galvanized or steel pipe nipples when making waterside connections. Use non-ferrous nipples only.

Make inlet and outlet water connections directly to the threaded bolt-on bronze tank flanges. Over tightening connections to the flanges may cause damage to the flange or tank and are not covered by warranty. For ease of service, install unions on inlet and outlet piping to the unit. Do not use galvanized nipples to make tank connections as these will cause corrosion and rust. Piping and components connected to the water heater must be suitable for potable water, for the water temperatures they will experience and for their application.

CAUTION: Flush all water supply lines before connecting the unit.

FILLING THE UNIT

1. Fill the system with water. To be sure that the unit is not “air bound,” open the relief valve. Leave the valve open until a steady flow of water is observed. Close valve and complete filling the system.
2. In hard water areas, potable water treatment should be used to reduce introduction of minerals into the system. Minerals in the water can collect on the tubes and heat-exchanger surfaces reducing the life of the product. Heat exchanger failure due to scale accumulation is not covered by the product warranty.
3. Make sure there are no system leaks. DO NOT use petroleum based stop-leak products. All system leaks must be repaired.

RELIEF VALVE PIPING

The water heater is supplied with a pressure and temperature relief valve, sized in accordance with ASME requirements. Each relief valve should be piped to a suitable floor drain. No reducing coupling or other restriction can be installed in the discharge line. It is strongly recommended that this valve should be manually operating at least once a year.

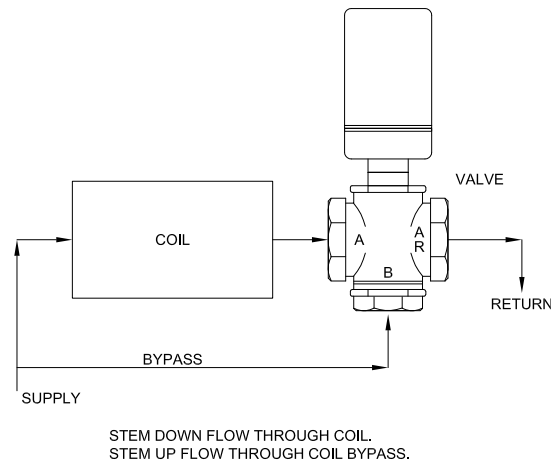
WARNING: Make sure the safety relief valve is piped to a proper drain per instructions. Scalding injury and/or water damage can occur from either the manual lifting of the lever or the normal operation of the valve if it is not piped to a proper drain. Insure that the safety relief valve piping is of the proper material and rating for the temperature and pressure of the system and that it is secured to prevent possible injury. If the valve fails to flow water or reseal, consult factory. The relief valve is a primary safety device.

SEQUENCE OF OPERATION

(Refer to figure on page 7)

1. When power is supplied through the unit's On-Off switch, if the stored water temperature is below the operating thermostat set point, the limit operating circuit closes creating a call-for-heat-demand, which energizes the actuator on the three-way mixing valve.
2. The three-way mixing valve returns circulating boiler water to the boiler supply loop through its bypass ports. On a call-for heat, the actuator motor runs and the actuator shaft extends causing the valve to divert the boiler water through the heat exchanger before it is returned to the boiler supply loop.

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3. When the demand is satisfied, the limit operating circuit opens and the valve actuator is de-energized. The actuator motor stops running and the actuator shaft spring returns to the retracted position causing the boiler water to divert through the bypass ports and return to the boiler water supply loop.

START-UP PROCEDURE

1. When placing the unit into operation, open relief valve to purge air from top of tank and begin to fill the tank with cold water. Check for plumbing leaks. Be sure the tank is completely filled before closing the relief valve.

CAUTION: Do not energize the heater until the tank is full of water. Serious damage may result.

2. Push control switch, located on the control box, to "ON" to activate the three-way valve and thermostats. Check the valve for operation; the valve actuator motor should "run" to open the valve when operating switch is pushed "on". Check operating thermostat settings.

Temperature Setting: The operating thermostat is set at the factory at approximately 120°F and the upper operating thermostat (if supplied) is set at approximately 125°F. Adjustment may be made by turning the thermostat's dial to the desired temperature. The temperature limiting device is factory set at 200°F.

CAUTION: Gradually introduce fluids to the unit. Failure to do so can cause damage to the heat exchanger.

3. Push the operating switch to "OFF" before opening manual main boiler water supply valve. Do not admit boiler water to the unit suddenly when empty or cold to prevent thermal shock. Gradually open boiler water supply valve until all passages of the heat exchanger are filled. Slowly bring the unit up to temperature.
4. Do not operate unit under conditions in excess of those specified on nameplate.

WARNING: Failure to operate the heat exchanger within the design pressure and temperature on the nameplate may result in damage to the heat exchanger and potential injury to adjacent personnel.

5. Open nearby hot water tap to maintain a flow of water through the tank when starting up units. Regulate flow of water through the tank to allow the control valve to cycle off and on, and check operation of all safety and operating controls.

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6. In all installations, there should be no pulsation or water hammer since this causes vibration and strain with resulting leaks.
7. Retighten bolting on all gasketed joints after the heat exchanger has reached temperature to prevent leaks and gasket failures. Retightening should be done uniformly and in a diametrically staggered pattern (see “Maintenance”).
 - a. On high pressure and high temperature applications or any application where spiral wound gaskets are required, it is recommended that the gasketed joints of the heat exchanger be retightened to the required torque (see “Maintenance”) after 24 hours at operating pressures and temperatures to compensate for any relaxation or creep that may have occurred.
 - b. In shutting down, remove all power from the system. Close all boiler water and cold water supply valves to the unit.
 - c. If the unit is removed from service for an extended period of time, it must be drain completely to eliminate the possibility of freezing and corrosion from stagnant water conditions.

MAINTENANCE

WARNING: To reduce the risk of electrical shock injury or death, on control systems using 120 volt external power, be certain switch is off and power disconnected before work is performed on this heater.

Temperature and Pressure Relief Valve

Operate the temperature and pressure relief valve at least once a year by lifting the lever briefly. If the valve does not open and close properly when testing, it must be replaced with a like relief valve.

Thermostats and Temperature Limiting Device

The temperature limiting device and thermostat temperature sensors extend into the water in the tank. Depending on the water conditions in your area, scale may coat the sensors. This coating will affect accuracy of sensors and can allow water temperature to exceed the desired limits. Remove and inspect these controls at necessary intervals. Remove scale if present.

Control Valve Actuator

The boiler water control valve actuator is sealed and requires no maintenance. Durability of valve stems and packing is dependent upon maintaining non-damaging water conditions. Inadequate water treatment or filtration can result in corrosion, scale, and abrasive particle formation. Scale and particulates can result in stem and packing scratches and can adversely affect packing life and other parts of the Hydronic system. Contact the manufacturer for replacement packing and stem & plug assembly.

Tank

Scale will normally form in the tank during operation and will accumulate on the bottom of the tank. The natural chemicals in the water forms scale which precipitate out during the heating cycles. Some water supplies contain more of these chemicals than others do, and the scale buildup will occur more rapidly. Other factors affecting the scale buildup are the amount of hot water used and the temperature of the water. The more hot water used the more fresh water containing the scale-forming chemicals enter into the tank. As the temperature of the water increases, the rate of scale deposited also increases. The frequency of inspections will be determined by the rate of scale buildup. Until the appropriate inspection

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and cleaning frequency is established, initially inspect the tank every six months or more frequently if higher scaling conditions are present.

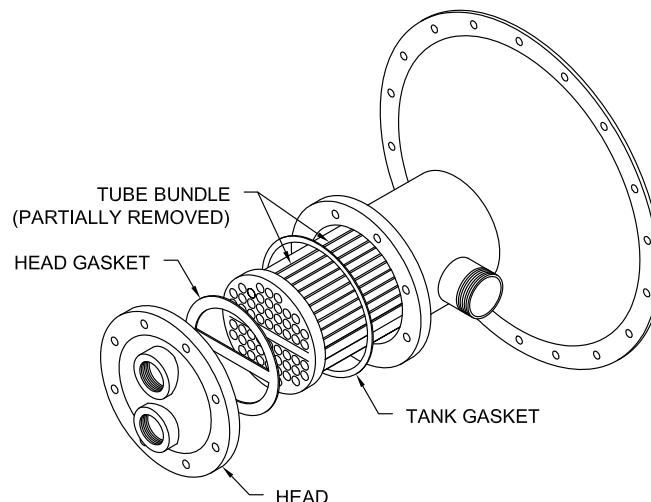
Flush the tank at two or three-month intervals depending on water conditions in your location to help prevent the accumulation of scale. **To flush:** turn off electrical disconnect switch to prevent the unit from operating. Open the drain valve and allow water to flow through the tank until it runs clear. Close the drain valve and turn the electrical switch back on.

WARNING: Since PVI cannot control the use of the water heater, water conditions, or maintenance, the warranty on the water heater does not cover poor performance, structural failure, or leaking due to an excessive accumulation of scale.

Cleaning the Heat Exchanger (refer to figure below)

1. Do not open until all pressure is removed, the unit is drained and the equipment surfaces cooled to ambient temperature.
2. Heat exchangers subject to fouling or scaling should be cleaned periodically. A light sludge or scale coating on the tube greatly reduces its effectiveness. A marked increase in pressure drop and/or reduction in performance usually indicate cleaning is necessary.
3. Tube bundle removal:
 - a. When practical, leave tube bundle attached to collar assembly and remove by unbolting collar assembly from tank.
 - b. During bundle removal, the dead weight of bundle should never be supported on individual tubes or contact any lined interior tank surface. Following removal, rest the bundle on the tube sheet, support plates, or wood blocks cut to fit periphery of the bundle.
 - c. Tube bundles may be raised using slings formed by bending light sheet metal into a "U" form and attaching lifting lugs to the ends of the sheets. Baffles can be easily bent and damaged if dragged over rough surfaces.
 - d. Before reinserting the tube bundle into the unit place the ring/tank gasket over the end of the tube bundle and bring forward to the backside of the tube sheet.

CAUTION: When cleaning a tube bundle, tubes should not be hammered on with any metallic tool and, in case it is necessary to use scrapers, care should be exercised that the scraper is not sharp enough to cut the metal of the tubes.



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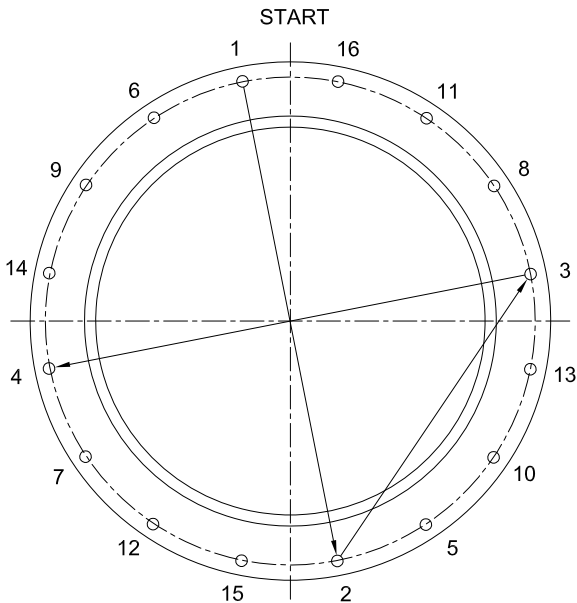
4. When replacing the heat exchanger head, use a torque wrench to tighten the bolts/studs and nuts. Use the following chart as a guide. All torque values apply to well-lubricated nut bearing surfaces.

TIGHTENING TORQUES

| COMPRESSED FIBER GASKETS | | | |
|--------------------------|---------------------------|------------------|-------------|
| Bolt Dia. | Recommended Torque ft-lbs | Torque Increment | Max. Torque |
| 1/2" | 40 | 5 | 60 |
| 5/8" | 80 | 5 | 120 |

| SPIRAL WOUND GASKETS | | | |
|----------------------|---------------------------|------------------|-------------|
| Bolt/Stud Dia. | Recommended Torque ft-lbs | Torque Increment | Max. Torque |
| 1/2" | 40 | 5 | 60 |
| 5/8" | 80 | 5 | 120 |
| 3/4" | 120 | 5 | 200 |
| 7/8" | 200 | 10 | 320 |
| 1" | 300 | 10 | 490 |
| 1 1/8" | 450 | 10 | 710 |
| 1 1/4" | 600 | 10 | 1000 |

5. Tighten uniformly and in a diametrically staggered pattern as illustrated below:



WARNING: It is extremely important to follow a proper tightening sequence. If not followed, the flanges can become cocked and a leak will result. When tightening flanges with spiral wound gaskets, if cocking occurs, the result can be deformation and non-repairable damage to the gaskets in addition to a resultant leak. Any gasket leak can result in potential injury to adjacent personnel.